## REMARKS

### I. STATUS OF THE CLAIMS:

Claims 1, 4 – 8, 10 – 12, and 16 – 22 are pending. Claim 21 has been deemed allowable by the Office. No claims have been amended and no new matter has been added.

### II. PRIOR ART REJECTIONS:

Claims 1, 4 – 8, and 10 – 12, 16 – 20, and 22 are rejected under 35 U.S.C. § 103(a) as being obvious over GB 1,052,118 (GB '118) in view of US 5,895,639 (Swain) and further in view of US 5,874,658 (Belter). In particular, the Office asserts that GB '118 and Swain each disclose a process for separating HF in the production of a fluoride-containing hydrocarbon by contacting the gaseous mixture with sulfuric acid.

The Office further asserts that it would have been obvious to one skilled in the art to use any known method, such as flash distillation or fractional distillation, or a combination of these methods to separate the HF from the sulfuric acid.

#### A. CLAIMED INVENTION:

Applicants have discovered that anhydrous HF having very low levels of sulfur and tar impurities (the latter expressed in terms of Total Organic Carbon or "TOC") can be separated from azeotropic HF/halocarbons mixtures by extracting the HF from the mixture using dilute sulfuric acid, subjecting the extracted HF to flash distillation, and then subjecting the flashed HF to column fractionation. This process surprisingly produces anhydrous HF having a sulfur impurity level of less than about 200 ppm.

#### B. PRIOR ART REFERENCES

##### 1. GB 1,052,118

GB '118 discloses a process for separating HF from a gaseous mixture produced by fluorinating a halocarbon with HF, wherein the mixture is contacted with aqueous sulfuric acid of at least 70 wt. % concentration to absorb the HF. GB '118 further teaches that the absorbed HF can be recovered via a stripping operation.

### 2. US 5,874,658 (Belter)

Belter discloses that an alkanolamine solution can be used as a phase separation additive to separate HF from saturated fluorinated aliphatic hydrocarbons. The HF can be recovered from the HF/alkanolamine mixture by distillation. Belter also discloses that 100% sulfuric acid or < 100% sulfuric acid can be used in lieu of the alkanolamine solution.

### 3. US 5,895,639 (Swain)

Swain, which is assigned to the same assignees as the present application, discloses a process for separating HF from an azeotropic mixture of HF and fluorocarbons using concentrated sulfuric acid as an extraction agent. According to Swain, the HF can be separated from the sulfuric acid via distillation.

## C. ARGUMENTS

### 1. References Cited by the Office:

The cited references, alone or in combination, fail to disclose a process involving the combination of flash distillation followed by column fractionation. It is incontrovertible that to establish a *prima facie* showing of obviousness, the cited references in combination must teach or suggest each and every element of the claimed invention. MPEP 2143. Here, the claimed invention specifically recites that the method for recovering anhydrous HF includes the step of subjecting extracted HF to flash distillation followed by fractional distillation. Since none of the references cited by the Office teach this element of the claimed invention, the combination of references does not render the invention obvious. The Office's rejection is, therefore, respectfully traversed.

### 2. Declaration of Hsueh S. Tung dated June 12, 2007:

The Examiner does not allege that the cited references teach a process involving flashing followed by fractional distillation. Instead, the Office takes Official Notice that

flashing and fractional distillation are known and conventional steps in the art and also argues that using a combination of different distillation methods to achieve the cumulative effect of the claimed invention would have been well within the skill of the artisan. More particularly, the Office alleges that there is no evidence on record to support the unexpected results of the claimed invention. According to the Office, applicants have not provided any comparative examples showing that fractional distillation of dilute sulfuric acid/HF without first flashing the composition would result in an anhydrous HF product having high levels of sulfur impurities.

Applicants have unexpectedly found that flashing an HF and sulfuric acid mixed stream and then fractionating the resulting HF distillate dramatically decreases the level of sulfur impurities in the HF product. One skilled in the art would *not* have known or expected that subjecting a mixture of hydrogen fluoride and dilute sulfuric acid to the *combination* of a flash distillation process followed by a fractionation process would dramatically reduce the amount of sulfur impurities in the process stream. Instead, one skilled in the art would have predicted that, based upon the boiling points of HF and sulfuric acid, column fractionation alone would remove substantially all sulfur impurities from an HF / sulfuric acid mixture. (Declaration by Hsueh S. Tung dated June 12, 2007).

As demonstrated in the Declaration by Hsueh S. Tung dated June 12, 2007, through applicant's extensive experience of actually attempting to separate dilute sulfuric acid from hydrogen fluoride using only column fractionation, they found that fractional distillation alone resulted in an anhydrous HF product containing relatively high levels of sulfur compounds. After substantial experimentation with different distillation techniques, applicants discovered that flashing the HF and sulfuric acid mixed stream *followed by* fractionation is capable of dramatically decreasing the level of sulfur impurities compared to fractionation alone. This result was unexpected.

## IV. CONCLUSION

In view of the Declaration by Hsueh S. Tung dated June 12, 2007, and the arguments presented above, the present application is believed to be in condition for allowance and an early notice thereof is earnestly solicited. The Office is invited to

contact the undersigned counsel in order to further the prosecution of this application in any way.

Respectfully submitted,

Dated: 06/13/2007

/jimmiejohnson/
Jimmie Johnson
Registration No. 52,485

Synnestvedt & Lechner
2600 Aramark Tower
1101 Market Street
Philadelphia, PA 19107
Telephone: (215) 923-4466

S:\H\HONEYWELL\Patents\ALLID\P26868 USA\PTO\Reply (OA 03-21-07).doc